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Differences in Expectations of Cleanliness among Students at Bowling Green State University

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Abstract

Objective: To determine if there are significant differences in perceptions of cleanliness between different demographic groups of undergraduate students at Bowling Green State University (BGSU). **Methods:** A cross-sectional survey was distributed to all undergraduate students at BGSU's main campus through the campus email system, and a two-sample t-test was used to analyze data. **Results:** There were significant differences in cleanliness perceptions between females and males and between Health Science and non-Health Science students. No significant differences were detected between first-year and second, third, and fourth-years students. **Discussion:** Possible psychological explanations of these differences were offered, and it is not possible to clearly determine why these differences in perceptions of cleanliness exist among students at BGSU's main campus.

Background

On the seven question roommate matching service at Bowling Green State University, at least one question is devoted to cleanliness. When matching and predicting positive roommate relationships, a certain level of reciprocity must be maintained about cleanliness.¹ When all students gather in a common space, however, will perceptions and expectations of cleanliness differ between different groups of students? Cleanliness has been shown to have a large impact on learning in higher education institutions, but no studies have examined perceptions of cleanliness in university dining facilities alone.²

At Bowling Green State University, two All You Care to Eat Dining Facilities, A and B, are popular spaces for students to gather for a meal. These two facilities were selected because they have similar environments, are on two different sides of the campus and attract many students, and both require students to eat in the facility and use facility dishware. When exposed to the same environments, how do different groups of students perceive cleanliness in the dining facilities? Specifically, is there a difference in perceptions of cleanliness between undergraduate female students and male students at Bowling Green State University's (BGSU) main campus? Do Health Science majors have different cleanliness perceptions than students in non-Health Science majors? Do first-year students have different perceptions of cleanliness than second-year or third and fourth-year students?

The study hypothesis is that there will be statistically significant differences in perceptions of cleanliness between all three of the comparisons. Specifically, that

females will rate the cleanliness of the dining facilities at BGSU lower than males, Health Science majors will rate the facilities lower than non-Health Science students, and that first-year students will rate the facilities lower than second, third, and fourth-year students.

Literature Review

Peer reviewed research articles pertaining to cleanliness and perceptions of cleanliness were gathered using the Bowling Green State University online libraries and EBSCOhost online search engine. The criteria for the literature review included: if an article discussed differences in perceptions between males and females, explored the importance of cleanliness in an environment, or evaluated attitudes surrounding cleanliness.

Existing literature covers the impact of cleanliness on learning, its importance in roommate matching, cleanliness satisfaction in food and health settings, and gender differences regarding cleanliness among older adults. Cleanliness and sanitation not only play a critical role in health throughout all stages of life, but cleanliness also affects the ability to learn. Higher education institutions have cut back on spending, and the number of janitorial staff has decreased. However, cleanliness of the classroom has shown to be an integral part of learning, especially at higher education institutions.² Cleaner classrooms provide fewer distractions and allow students to focus on learning. Cleanliness is asked on many roommate matching questionnaires because it is usually a variable that determines whether individuals will live well together. Cleanliness is

clearly an important factor when choosing or pairing roommates, and actually is related to retention rates at some universities.¹

Concern about cleanliness has not been limited to living styles, however. Several studies examined college student dining habits looking at what and how much they ate, when they ate, and where they ate.^{3,4} Overall dining hall satisfaction surveys have asked about satisfaction with dining experiences and quality of meals at the dining halls, but not the quality of cleanliness in the dining halls.^{3,4} When it comes to student awareness of food safety, research shows that students who take courses that discuss sources of food and food safety have a higher awareness of the safety of food.⁵

It has also been shown that educating college students about various health issues also produces favorable results in terms of awareness and behavior towards food safety practices.⁶ Having informational posters and hand sanitizers easily accessible has been shown to decrease the number of upper respiratory infections in residence halls.⁶ University studies in Ghana have also explored college student health-related behavior. After observing student hand washing after defecation, females were more likely to wash their hands than men, but the male students washed their hands for the correct amount of time and used soap.⁷

These gender studies are not limited to university students. A study of adult males and females determined that cleanliness was a factor that influenced whether or not a customer returns to a restaurant. When asked about the cleanliness of public restrooms, males felt the restrooms were dirtier than females.⁸

In Australia, adults were asked about their perceptions of food contamination and if they felt at risk for disease after learning about the handling processes of contaminated food. These researchers found that specific groups of people – those who have an income lower than \$25,000, those with less than a high school education, and those who participate in organized religion – were more concerned about their risk for disease from contaminated food.⁹

When researchers looked at cleanliness and the health field, they found that elderly females in inpatient care generally reported lower satisfaction than elderly males when it comes to cleanliness.¹⁰ Intensive care units were also studied for cleanliness. Surfaces closest to patients were tested for various infectious agents after different cleaning methods were implemented. The results showed that the current cleaning practices were not destroying as many bacteria as they should and should be improved.¹¹ Patients in hospital waiting rooms were asked to rank factors that influenced their perceptions of facility cleanliness. They reported that the appearance of the floors, ceilings, walls, toilets, doors, and the presence of odors were the most influential aspects of the room.¹² Lastly, pharmaceutical studies show that cleanliness and sanitation of working spaces were extremely important in making sure that safe and effective drugs were distributed to patients.¹³ Sanitation and cleanliness are important in many different areas, and are especially important in the health care field.

Materials and Methods

This study was conducted at Bowling Green State University's main campus in Bowling Green, Ohio in the spring of 2015. Approximately 15,465 part-time and full-time

undergraduate students attend this campus and were invited to participate in the study. The study was discussed with the director of BGSU's dining services and an agreement was reached to collaborate on the results to ensure student satisfaction of the dining halls. Before any research began, the study was approved by the Human Subjects Review Board (HSRB).

Completing the survey indicated that the participant had given their informed consent (*Figure 1*). Using Qualtrics Online Surveying Software, a fourteen (14) question survey was created asking about sex, intended field of study, semester at BGSU's main campus, and student satisfaction with the cleanliness of the two dining facilities on campus, Dining Facilities A and B. They were also asked if they felt either of the dining halls was cleaner than the room or suite where they live while attending school at BGSU. The rating scale was as follows: 1 being very unsatisfied and completely disagree, 10 being very satisfied and completely agree (*Figure 2*).

After communicating with the university's Department of Institutional Research, all part-time and full-time undergraduate's emails at the main campus were obtained and uploaded into Qualtrics. The survey invitation letter was included in the body of the email along with the survey, and was sent to all 15,465 students on Wednesday, April 1. (*Figure 3*). Qualtrics Surveying Software allows for a user to send only 10,000 emails per week, so two accounts were needed to make sure the survey was distributed to all students on the same day. The email list was split into smaller lists, and uploaded into Qualtrics as a panel. After one week, the survey was deactivated on Qualtrics and closed. The data was downloaded from Qualtrics in a Microsoft Excel Spreadsheet for easier data analysis.

Results

A Two-Sample t-test was performed in Microsoft Excel to determine if there was a significant difference in data collected from students (p -value is less than or equal to 0.05). The data analyzed included male and female cleanliness satisfaction, male and female comparison of each dining facility to the room or suite where they live while attending BGSU, Health Science and non-Health Science student cleanliness satisfaction, Health Science and non-Health Science comparison of each dining facility to the room or suite where they live while attending BGSU, and first-year and upper-class student cleanliness satisfaction.

Dining Facility A

Two-hundred and twenty-six females and seventy-seven males rated their cleanliness satisfaction of Dining Facility A. The average rating for females was 6.77 and the average rating for males was 6.44. After performing the two-sample t-test, $t=5.00$, $df=301$, and $p<0.001$. Since the p -value is less than 0.05, it can be concluded that compare to males, females generated significantly higher ratings of the cleanliness of Dining Facility A. Two-hundred and twenty females and seventy-six males responded to the next question, comparing the dining facility to their living quarters. On average, females reported a score of 5.15 and males reported a score of 5.87. This data set yielded $t=10.82$, $df=294$, and $p<0.001$. Thus, males rated Dining Facility A as cleaner than the room or suite which they live in while attending BGSU than females did.

One-hundred and seventy-nine students majoring in Health Sciences and one-hundred and forty-one students not majoring in Health Science reported on their

satisfaction of cleanliness of Dining Facility A. The mean rating from Health Science students was 7.14, and non-Health Science students rated the facility 6.01. After performing the t-test, $t=10.04$, $df=318$, and $p<0.001$. Since the p -value is less than 0.05, it can be concluded that Health Science students' ratings of cleanliness in Dining Facility A were significantly higher than non-Health Science students. One-hundred and seventy-four Health Science students and one-hundred and twenty-one non-Health Science students rated the cleanliness of Dining Facility A compared to where they live. Health Science students gave a mean rating of 5.99, and non-Health Science students gave a mean rating of 4.32. This provided $t=14.11$, $df=293$, and $p<0.001$, showing that compared to non-Health Science students, Health Science students significantly rated Dining Facility A as cleaner than where they live.

When comparing Health Science females to Health Science males, a two-sample t-test cannot be used because the sample size of Health Science males is too small. 150 non-Health Science females ranked Dining Facility A 6.86, and 66 males ranked 6.55 which yielded $t=4.20$, $df=214$, and $p<0.001$. Compared to males, non-Health Science females significantly thought Dining Facility A was cleaner.

When comparing cleanliness perceptions of students from different class ratings, there was not a significant difference in responses for Dining Facility A. One-hundred and thirty-six first-year students reported a mean rating of 6.65, and eighty-three second-year students reported a mean rating of 6.57 of this facility. When performing the t-test on these two samples, $t=0.57$, $df=217$, and $p>0.05$, indicating there was no significant difference in reported ratings. When comparing first-year students to third and fourth-year students, there was also no significant difference in reported ratings.

The mean rating of seventy-one third and fourth-year students was 6.72. From this comparison, $t=0.48$, $df=205$, and $p>0.05$.

Of the first-year students, ninety-three were female and thirty-seven were male. First-year females rated Dining Facility A on average 5.26, and first year males averaged 6.12. With a $t=4.42$, $df=128$, and $p<0.001$, it can be concluded first year males reported significantly higher cleanliness ratings than females for Dining Facility A.

Dining Facility B

One-hundred and seventy females and fifty-two males rated their cleanliness satisfaction of Dining Facility B. The mean rating for females was 6.48 and the mean rating for males was 6.21. After performing the two-sample t-test, $t=3.41$, $df=220$, and $p<0.001$. Since the p -value is less than 0.05, it can be concluded that females significantly thought Dining Facility B was cleaner than males did, similar to Dining Facility A. 168 females and 56 males compared the dining facility to their living quarters. Females reported a mean score of 5.08 and males reported a mean score of 5.41. This data set yielded $t=4.28$, $df=222$, and $p<0.001$. Thus, compared to females, males reported that Dining Facility B was significantly cleaner than the room or suite in which they live while attending BGSU.

One-hundred and thirty-eight students who are majoring in Health Sciences and seventy-five students not majoring in Health Science reported on their satisfaction of cleanliness of Dining Facility B. Health Science students rated the facility with a mean 6.66, and non-Health Science students rated the facility 5.96. After performing the t-test, $t=4.88$, $df=211$, and $p<0.001$. Since the p -value is less than 0.05, it can be concluded

that Health Science students rated Dining Facility B as significantly cleaner than non-Health Science students. One-hundred and thirty-six Health Science students and seventy-seven non-Health Science students rated the cleanliness of Dining Facility B to where they live while attending BGSU. Health Science students gave a mean rating of 5.51, and non-Health Science students gave a mean rating of 4.69. After performing the two-sample t-test, $t=5.75$, $df=211$, and $p<0.001$, indicating that compared to non-Health Science students, Health Science students rated Dining Facility B as significantly cleaner than where they live.

Similar to Dining Facility A, not enough Health Science males reported their cleanliness satisfaction of Dining Facility B to perform a two-sample t-test. One-hundred and sixteen non-Health Science females reported a mean value of 6.41 and forty-four non-Health Science males rated a mean value of 6.5 for Dining Facility B, which provided $t=1.02$, $df=158$, and $p>0.05$. No significant difference can be reported between non-health science females and males regarding Dining Facility B.

One-hundred and sixteen first-year students reported a mean rating of 6.46, and sixty second-year students reported a mean rating of 5.70 of Dining Facility B. When performing the t-test on these two samples, $t=4.78$, $df=174$, and $p<0.001$, indicating there was a significant difference in ratings of cleanliness of Dining Facility B. When comparing first-year students to third and fourth-year students, there was no significant difference in reported ratings. Thirty-eight third and fourth-year students had a mean rating of 6.82. When comparing first-year students to third and fourth-year students, $t=1.93$, $df=152$, and $p>0.05$. Thus, there was no significant difference in ratings.

Of the first-year students that rated Dining Facility B, eighty-five were female and twenty-eight were male. First-year females rated Dining Facility B a mean value of 6.53, and first-year males provided a mean of 6.50. Since the sample size of first-year males was less than thirty, using a two-sample t-test is not appropriate and no conclusions can be drawn. Even after performing a t-test, the results still came out with a $t=0.14$, $df=111$, and $p>0.05$ which would have shown that first-year females and first-year males did not have significantly different ratings of Dining Facility B.

Discussion

There are a few possible psychological explanations that can be offered to account for the differences in perceptions of cleanliness between females and males overall.

First, the idea of emotional valence may be different between genders. Emotional valence can be understood as the internal attraction or aversion towards an object or event.¹⁵ Perhaps students that identify as female may have more of a positive internal emotion towards Dining Facility A as a whole than males. Women may make meals their social time to catch up with friends, talk about schoolwork, and enjoy the company of others more than males. When women are enjoying the company of significant others or friends, they may be more likely to associate their positive feelings and emotions with the meal and overall experience at the facility. If a woman's attention is focused on the social interaction and interpersonal relationships, there is a possibility that she may be less focused on the environment and cleanliness status of the facility. While women may be more attentive and aware of interpersonal relationships, men may pay more

attention to, and even might be more critical of the appearance or cleanliness of a dining facility. If men simply go to Dining Facility A to eat, not as social opportunity, their attention may be more focused on the cleanliness status of the environment.

The desire to please others and social acceptance also may explain response difference between females and males. Women might be more concerned about pleasing others, and therefore could be more likely to provide higher ratings of the dining facilities.

The female to male response ratio is not representative of the female to male ratio of students at BGSU's main campus, which may contribute to the significant differences. The university's main campus breakdown is 56% female and 44% male, while the survey responses were 72% female and 28% male.¹⁴ Women may be more likely to display empathy and have an interpersonal desire to help a stranger by responding to the survey. Perhaps women are more apt to become involved in interpersonal research while men are more likely to participate in laboratory research. If women are more likely to use human subjects in research, they may understand and be empathetic towards responding to surveys. If they have a greater understanding of the importance of survey responses, they may have been more inclined to respond even if their opinions were neutral. Men were less inclined to respond, so the men that did choose to respond may have done so because of extreme positive or negative feelings about the dining facilities. Men might not be willing to respond to a survey if their responses are relatively neutral; only if they feel they have something important to express about the dining facilities.

Expected gender roles and pride in filling those roles successfully also may impact the results. College males may openly admit they are not as clean, and may even take pride in it. Perhaps males take pride in being dirty as a sign of “manliness,” so to postulate that the dining facility is cleaner than where they live may have triggered a sense of pride in regards to societal expectations on what makes a man manly. On the opposite side, perhaps women begin to feel defensive when someone suggests they might not be living up to the expected role that women are in charge of housework and cleaning. As a woman, to suggest that they are not clean might seem like an insult to them as a person, where men might take pride in the fact they are not clean.

It is also important to discuss the degree in which students accurately reported their feelings, opinions, and perceptions of cleanliness. The rating scale students were asked to report on may not have accurately represented students’ true perceptions about the facility. Also, everyone may not be defining cleanliness in the same way, therefore causing inaccurate reporting. Health Science students may have more education about foodborne illness and may view a facility as clean when no sources of infection or illness are present. Non-Health Science students may view a facility as clean when there are no pieces of food or trash laying on the floor or left on the tables. This may have created the gap in responses between Health Science and non-Health Science student ratings. When students visit the dining facilities, different groups of students may include different aspects of the dining facility in their evaluations of cleanliness. For example, one student may pay attention to the cleanliness of the dishware when evaluating overall cleanliness, while another may not include the status of the dishware when evaluating overall cleanliness. There is a possibility that increased

awareness, education, and common understanding of cleanliness and food safety may affect student ratings of cleanliness at BGSU.

Since students were able to take the survey on mobile devices and laptops, there is a high probability that students responded to the survey while eating in either dining facility. The cleanliness status of the dining facility at the time the survey was sent out may have played a large impact on the responses students provided. If students were at either dining facility at the time the survey, they may have looked around the facility and only provided a rating based on what they saw at the time. Students that were not at the dining facilities at the time they took the survey were forced to make retrospective ratings of the dining facilities – i.e., ratings based solely on memory. The recency and primacy effects may have impacted student responses if they had to recall from memory. The recency effect suggests that when recalling past experiences, the most recent experience will be easiest to recall and will have a large impact on memory of a situation. The primacy effect suggests that we remember the first experience with an environment, situation, or stimulus, and the first experience is easiest to recall and most prevalent. If a student typically has a positive experience in the dining facilities but the most recent visit was not positive, the recency effect predicts that they are more likely to recall the dining facility in a negative light. This could have been the case in many student reportings if they had base their ratings on their memory.

Some limitations of the study included the small sample size, the female and male ratio of students overall compared to the female and male ratio of survey participants, and the method of contacting students and lack of incentives.

First, if more students would have participated in the survey, more statistical comparisons could have been made comparing genders of different class rankings. Since only a small percentage of undergraduate students that attend BGSU's main campus responded, the two-sample t-test was not appropriate and certain comparisons were unable to be made. Additionally, the number of females that participated was more than double the number of males that participated in the study. If the female to male ratio of students that participated in the survey was more representative of the ratio of female to male students at the main campus as a whole, different results may have occurred.

Also, students were invited to participate by email. All students enrolled at BGSU have an email provided by the university, but some students may have had technical issues and may have not received the email and invitation to participate. Additionally, students receive many emails from the university every day, and may have ignored the email with this study. If students were contacted in person or emailed more than once, there might have been a higher response rate. Since the survey was completely anonymous, there was no way to tell which students had already taken the survey and which students had not. Sending out the survey to all students again might have caused students to take the survey twice, which would not have produced accurate results. Additionally, if students were surveyed in person, there might have been some sort of social influence or pressure to answer in a certain way, and would not have been completely anonymous. Therefore, email seemed to be the best option for the survey but there may have been other surveying methods that may have yielded a higher response rate. If other incentives were offered, more students may have participated.

However, to keep the survey completely anonymous and avoid collecting any information that would identify students, incentives could not be offered. These limitations are all possible areas of improvement for future studies.

Figures

Figure 1. Consent document presented at the beginning of the survey.



Consent for Anonymous Survey

Hello,

My name is Ashley Meehan and I am inviting you to help me determine if student expectations of cleanliness are different for different groups of students. I invite you to help me by completing a survey. Your participation is entirely voluntary and your responses will be anonymous.

I am asking you to take about 3-5 minutes to answer 14 questions on the survey. All questions can be answered with a click. There are no right or wrong answers to the questions, only your responses and opinions. There is no way to identify individuals. Your responses will be added to those of others. There are no risks beyond those encountered in a typical day. You may benefit by learning about how research is conducted.

The information from this study will be used to evaluate student expectations of cleanliness where they eat while attending BGSU.

The study is voluntary, and you are free to skip questions or stop and withdraw at any time. This survey will not have any impact on your relationship or standing at BGSU.

Responses are not submitted until you click "submit" at the end of the survey.

You must be 18 years of age or older to participate. Submitting the survey indicates your consent to participate. Since this study is online, I suggest that you clear your internet browser and page history after you have completed the survey.

If you have any other questions or concerns about the survey, feel free to contact me at (585)-747-5985 or ashmeeh@bgsu.edu or Dr. Fleming Fallon at (419)-372-8316 or ffallon@bgsu.edu. If there are any questions about participant rights, you can contact the Bowling Green Human Subjects Review Board at (419)-372-7716 or hsrb@bgsu.edu.

Thank you for your time.

Ashley Meehan

Figure 2. Survey distributed to all undergraduate students at BGSU's main campus.

1 Sex:

- ☐ Female (1)
- ☐ Male (2)

2 How many semesters have you attended BGSU? Include current semester.

- ☐ 1 (1)
- ☐ 2 (2)
- ☐ 3 (3)
- ☐ 4 (4)
- ☐ 5 (5)
- ☐ 6 (6)
- ☐ 7 (7)
- ☐ 8 (8)
- ☐ 9 or more (9)

3 Which of the following best describes your field of study?

- ☐ Health/Medical Science (1)
- ☐ Not Health/Medical Science (2)

4 Do you live on campus?

- ☐ Yes (1)
- ☐ No (2)

5 Do you eat at The Oaks Dining Facility? If yes, continue to question 6. If no, skip to question 10.

- ☐ Yes (1)
- ☐ No (2)

6 How satisfied are you with the cleanliness of The Oaks Dining Facility?

- ☐ 0 (0) Very Unsatisfied
- ☐ 1 (1)
- ☐ 2 (2)
- ☐ 3 (3)
- ☐ 4 (4)
- ☐ 5 (5) Somewhat Satisfied
- ☐ 6 (6)
- ☐ 7 (7)
- ☐ 8 (8)
- ☐ 9 (9)
- ☐ 10 (10) Very Satisfied

7 The Oaks Dining Facility is cleaner than the room(s)/suite I live in while attending BGSU

- ☐ 0 (0) Completely Disagree
- ☐ 1 (1)
- ☐ 2 (2)
- ☐ 3 (3)
- ☐ 4 (4)
- ☐ 5 (5) Neither agree nor disagree
- ☐ 6 (6)
- ☐ 7 (7)
- ☐ 8 (8)
- ☐ 9 (9)
- ☐ 10 (10) Completely Agree

8 Do you plan on eating at The Oaks Dining Facility next year?

- ☐ Yes (1)
- ☐ No (2)

9 Does cleanliness of The Oaks Dining Facility influence your response to Question 8?

- ☐ Yes (1)
- ☐ No (2)

10 Do you eat The Carillon Place Dining Facility? If yes, continue to question 11. If no, continue to the bottom of the page.

- ☐ Yes (1)
- ☐ No (2)

11 How satisfied are you with the cleanliness of The Carillon Place Dining Facility?

- ☐ 0 (0) Very Unsatisfied
- ☐ 1 (1)
- ☐ 2 (2)
- ☐ 3 (3)
- ☐ 4 (4)
- ☐ 5 (5) Somewhat Satisfied
- ☐ 6 (6)
- ☐ 7 (7)
- ☐ 8 (8)
- ☐ 9 (9)
- ☐ 10 (10) Very Satisfied

12 The Carillon Place Dining Facility is cleaner than the room(s)/suite I live in while attending BGSU

- ☐ 0 (0) Completely Disagree
- ☐ 1 (1)
- ☐ 2 (2)
- ☐ 3 (3)
- ☐ 4 (4)
- ☐ 5 (5) Neither agree nor disagree
- ☐ 6 (6)
- ☐ 7 (7)
- ☐ 8 (8)
- ☐ 9 (9)
- ☐ 10 (10) Completely Agree

13 Do you plan on eating at The Carillon Place Dining Facility next year?

- ☐ Yes (1)
- ☐ No (2)

14 Does cleanliness of The Carillon Place Dining Facility influence your answer to Question 13?

- ☐ Yes (1)
- ☐ No (2)

Figure 3. Invitation letter included in the body of the email.



Invitation for Anonymous Survey

Hello,

My name is Ashley Meehan and I am inviting you to help me determine if student expectations of cleanliness are different for different groups of students. I invite you to help me by completing a survey that will be sent to you within the next week. Your participation is entirely voluntary and your responses will be anonymous.

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Thank you for your time.

Ashley Meehan

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